

Claims

1. A lithium-ion-conducting sulfide-based crystallized glass comprising: lithium (Li), phosphorus (P), and sulfur (S) elements, wherein the glass has diffraction peaks at $2\theta = 17.8 \pm 0.3$ deg, 18.2 ± 0.3 deg, 19.8 ± 0.3 deg, 21.8 ± 0.3 deg, 23.8 ± 0.3 deg, 25.9 ± 0.3 deg, 29.5 ± 0.3 deg and 30.0 ± 0.3 deg in X-ray diffraction (CuK α : $\lambda = 1.5418$ Å):
- 10 2. A method of producing a lithium-ion-conducting sulfide-based crystallized glass comprising heat-treating a sulfide-based glass comprising 68 to 74 mol% of Li_2S and 26 to 32 mol% of P_2S_5 at 150 to 360°C.
- 15 3. The method according to claim 2, wherein the Li_2S is prepared by reacting lithium hydroxide with hydrogen sulfide in an aprotic organic solvent to produce crude Li_2S and purifying the crude Li_2S by cleaning with an organic solvent at 100°C or more.
- 20 4. The method according to claim 2, wherein the total amount of sulfur oxides contained in the Li_2S is 0.15 mass% or less and the amount of lithium N-methylaminobutyrate (LMAB) is 0.1 mass% or less.
- 25 5. The method according to claim 2, wherein phosphorus (P) and sulfur (S) at a molar ratio corresponding to P_2S_5 are used

instead of the P_2S_5 .

6. The method according to claim 2 or 5, wherein the sulfide-based glass is produced from Li_2S and P_2S_5 or phosphorus (P) and sulfur (S) by a mechanical milling process.

7. A lithium-ion-conducting sulfide-based crystallized glass produced by the method according to claim 2 or 5.

10 8. A solid electrolyte for a lithium rechargeable battery comprising the lithium-ion-conducting sulfide-based crystallized glass according to claim 1 as a material.

15 9. A solid electrolyte for a lithium rechargeable battery comprising the lithium-ion-conducting sulfide-based crystallized glass according to claim 7 as a material.

10. An all-solid battery comprising the solid electrolyte according to claim 8.

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11. An all-solid battery comprising the solid electrolyte according to claim 9.